

REMARKS

Claims 7-9 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,070,518 to Hoffman. Hoffman was cited as disclosing a copper paste meeting the terms of the rejected claims, including an organic vehicle (citing column 4, lines 1-15) and an  $Fe_2O_3$  particle (citing column 3, lines 20-30), and which further comprises a ceramic particle having an average particle size of 100 nm or less (citing column 2, lines 55-60 and column 3, lines 45-60).

Applicants traverse, and respectfully request the Examiner to reconsider in view of the amendment to the claims and the following remarks.

Hoffman discloses a copper paste containing copper powder, an inert liquid vehicle which may be water or any one of various organic liquids (Abstract and column 4, lines 1-2) and certain alkali metal/lead borosilicate glass powders (Abstract at column 1, line 63-column 2, line 30).

Present claim 7 differs from the copper paste of Hoffman in that claim 7 requires “an  $Fe_2O_3$  particle”, whereas the  $Fe_2O_3$  cited by the Examiner is a constituent of the glass (column 3, lines 23-30). A “glass” is a fused mixture of the silicates of various alkali and alkaline earth or heavy metals (Hackh’s Chemical Dictionary, Fourth Edition (1969)). As described in Hoffman,  $PbO$  is an essential component of the glass for providing low viscosity and low softening point (column 2, lines 40-41), but that doesn’t mean that Hoffman discloses  $PbO$  particles. Likewise, although the glass of Hoffman may contain  $Fe_2O_3$  as a constituent component, along with many other oxides as shown, for example, in Tables 2 and 3 of Hoffman, that does not mean that Hoffman discloses “ $Fe_2O_3$  particles”.

To more clearly distinguish over Hoffman, claim 7 has been amended to recite that the copper paste comprises a copper powder, an organic vehicle and an  $\text{Fe}_2\text{O}_3$  particle mainly comprising  $\text{Fe}_2\text{O}_3$ . Support at page 7, lines 23-25. The claimed  $\text{Fe}_2\text{O}_3$  particles are further characterized in new claim 11 as having an average particle size of 1  $\mu\text{m}$  or less (support at page 8, lines 1-2 of the specification) so as to distinguish over the glass powder of Hoffman, which when combined with copper powder is such that at least 90% of the particles are no greater than 5 microns (column 3, lines 54-56 of Hoffman). Namely, the glass particles of Hoffman containing up to 10%  $\text{Fe}_2\text{O}_3$  and having a particle size not greater than 5 microns do not disclose the claimed  $\text{Fe}_2\text{O}_3$  particles mainly comprising  $\text{Fe}_2\text{O}_3$  and having an average particle size of 1  $\mu\text{m}$  or less.

In view of the above, it is respectfully submitted that claims 7-9 define novel and unobvious subject matter, and withdrawal of the foregoing rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claims 1-6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,217,989 to Brody et al in view of Hoffman.

Brody et al was cited as teaching a wiring board including a conductor layer 24 comprising Fe and Cu and at least one of a radiator, connection terminal, cover or circuit component 27 connected to the conductor layer through a joining member 20 obtained by coating a copper paste and simultaneously firing the green sheet and coated copper paste. The Examiner relied on Hoffman as disclosing the copper paste of the present invention including an  $\text{Fe}_2\text{O}_3$  particle.

The reason for rejection was that it would have been obvious to use the copper paste of Hoffman in the invention of Brody et al so as to allow the same to be fired in a non-oxidizing atmosphere to produce conductor patterns having good, reproducible conductivity, adhesion and solderability (citing column 1, lines 65-68 of Hoffman).

Applicants respond as follows.

Contrary to the Examiner's suggestion, Fig. 2 of Hoffman shows a line-to-via connection 20 on a green sheet blank 22 which connects to conductor via 27 (column 1, lines 51-61). That is, via 27 of Brody et al is not "at least one of a radiator, a connection terminal, a cover and a circuit component" as required by present claim 1.

The Examiner further cited Brody et al as teaching the use of a copper paste comprising Fe and Cu. However, that is not correct. There is no mention of a conductor layer or copper paste containing Fe and Cu as suggested by the Examiner. Brody et al mentions only "copper paste" at column 1, line 17.

To more clearly distinguish over the cited prior art, claim 1 similar to claim 7 has been amended to recite that the  $\text{Fe}_2\text{O}_3$  particle mainly comprises  $\text{Fe}_2\text{O}_3$ , to thereby distinguish over the  $\text{Fe}_2\text{O}_3$  glass component of Hoffman. See also new claim 10 which further characterizes the  $\text{Fe}_2\text{O}_3$  particle as having an average particle size of 1  $\mu\text{m}$  or less. The glass particles of Hoffman containing up to 10 %  $\text{Fe}_2\text{O}_3$  and having a particle size not greater than 5 microns do not disclose  $\text{Fe}_2\text{O}_3$  particles mainly comprising  $\text{Fe}_2\text{O}_3$  as required by amended claim 1 or the  $\text{Fe}_2\text{O}_3$  particles having an average particle size of 1  $\mu\text{m}$  or less as required by new claim 10.



Moreover, although Brody et al does disclose printing conductive lines of a copper paste on a green sheet, and then simultaneously firing the same (column 1, lines 29-37). There is no motivation to use the copper paste of Hoffman (which is applied to a thin ceramic substrate which has already been sintered-column 4, lines 45-53 and column 5, lines 43-45 of Hoffman) in Brody et al where the copper paste is printed onto a green sheet prior to firing the ceramic substrate.

Claim 9 further requires a ceramic particle having an average particle size of 100 nm or less which is not disclosed by the glass powder of Hoffman which specifies a particle size of not greater than 5 microns.

For the above reasons, it is respectfully submitted that the amended claims are patentable over Brody in view of Hoffman, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1, 2 and 4-11 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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